

**TECHNICAL REVIEW DOCUMENT**  
**for**  
**RENEWAL**  
**of**  
**OPERATING PERMIT 95OPPR069**  
to be issued to:

Lamar Utilities Board  
**Lamar Light and Power**  
Prowers County  
Facility Identification Code 0990006

Michael E. Jensen  
November 9, 2001

**I. PURPOSE:**

This document will establish the basis for decisions made regarding the applicable requirements, emissions factors, monitoring plan and compliance status of emission units covered by the renewed operating permit proposed for this site. The original Operating Permit was issued July 1, 1997, and expires on July 1, 2002. This document is designed for reference during the review of the proposed permit by the EPA, the public, and other interested parties. The conclusions made in this report are based on information provided in the renewal application submitted June 5, 2001; previous inspection reports, as well as telephone conversations with the applicant. Please note that copies of the Technical Review Document for the original permit and any Technical Review Documents associated with subsequent modifications of the original Operating Permit may be found in the Division files as well as on the Division website at <http://www.cdphe.state.co.us/ap/Titlev.html>.

On April 16, 1998, the Colorado Air Quality Control Commission directed the Division to implement new procedures regarding the use of short-term emission and production/throughput limits on Construction Permits. These procedures are being directly implemented in all Operating Permits that had not started their Public Comment period as of April 16, 1998. All short term emission and production/throughput limits that appeared in the Construction Permits associated with this facility that are not required by a specific State or Federal standard or by the above referenced Division procedures have been deleted and all annual emission and production/throughput limits converted to a rolling twelve (12) month total. Note that, if applicable, appropriate modeling to demonstrate compliance with the National Ambient Air Quality Standards was conducted as part of the Construction Permit processing procedures. If required by this permit, portable monitoring results and/or EPA reference test method results will be multiplied by 8760 hours for comparison to annual emission limits unless there is a specific condition in the permit restricting the hours of operation.

## **II. SOURCE DESCRIPTION:**

This facility generates electricity for primary, emergency, and peaking use and is classified under the Standard Industrial Classification code 4911. The facility has an industrial boiler burning natural gas or diesel fuel to produce steam for a 25 mega-watt turbine/generator set. In February of 2001 a prototype natural gas fired combustion turbine powering a generator with a 4.2 megawatt output was placed into service.

In addition to the operating boiler and the combustion turbine, the facility has three (3) grandfathered boilers and two (2) grandfathered internal combustion engine/generator sets. The boilers are designated as Baddehauser boiler #1, Riley boiler #2, and Union Ironworks boiler #3 on the plot plan supplied with the application. The Division records report the boilers are not used. However, in order to keep the equipment from having specific operating permit requirements, a condition was added under Section I of the Operating Permit that the boilers may not operate without first applying for and obtaining a modification to the Operating Permit allowing operation. The engine/generator sets are identified as Worthington #46 and Fairbanks-Morse #49. The engines are insignificant sources as long as the operating hours for each engine remain below 100 hours per year. A condition was added under Section I of the Operating Permit that restricts the operating hours of the engines. Diesel fuel is stored on-site in a 500,000 gallon above ground storage tank.

The plant is located at 100 North Second Street in the rural city of Lamar in Prowers County, Colorado. The State of Kansas is designated as an affected state located within 50 miles of the plant. There are no Federal Class I designated areas within 100 kilometers of the plant. The area in which the plant operates is designated as non-attainment for Particulate Matter under 10 microns (PM<sub>10</sub>).

The sources at the facility, except for the combustion turbine, were constructed prior to the creation of the New Source Review/Prevention of Significant Deterioration (NSR/PSD) regulations on December 5, 1974, and the adoption of the current regulations on August 7, 1980. The boiler satisfies the criteria for identification as one of the NSR/PSD special category of sources (fossil fuel-fired steam electric plants of more than 250 MMBtu/hr heat input) subject to a major source threshold of 100 tons per year for a regulated pollutant. This facility is, therefore, a major PSD source for sulfur dioxide, nitrogen oxides and carbon monoxide emissions. The facility has not been subject to any previous PSD review. PSD/NSR requirements (as contained in 40 CFR Part 52 and Colorado Regulation No. 3, Part B) shall apply to any source modification, or contemporaneous modification of several sources, that results in an increase of the source's potential-to-emit above the applicable PSD/NSR threshold. There are no other Operating Permits associated with this facility for purposes of determining the applicability of NSR/PSD regulations.

The facility is not subject to the requirements of Section 112(r)(7), the Accidental Release Plan Program of the Clean Air Act. The boiler and the combustion turbine are exempt from the provisions of the Title IV (Acid Rain) program.

None of the emission points at this facility have pre-control emissions that exceed or are equivalent to the major source threshold and use a control device to achieve compliance with an emission limitation or standard to which they are subject. Therefore, none of the sources are subject to the provisions of the Compliance Assurance Monitoring (CAM) program as set forth in 40 CFR Part 64 as adopted by reference into Colorado Regulation No. 3, Part C, Section XIV.

The renewal application and recent inspection reports identify the facility to be in compliance with all the applicable requirements.

The following table presents the tabulation of the emissions for the facility based on the updated emission factors.

	POTENTIAL TO EMIT, Tons Per Year					
	PM	PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>x</sub>	VOC	CO
Unit 6 318 MMBtu/Hr Boiler - NG	11.14	11.14	0.88	806	8.06	123
Unit 6 318 MMBtu/Hr Boiler - Diesel	20.0	10.0	711	240	10.4	50.1
Unit 7 36 MMBtu/Hr NG Fired Turbine	6.61	6.61	7.41	15.64	1.90	19.03
Unit 46 Worthington 1530 HP Diesel Engine/Generator @ 100 hrs/yr	0.17	0.17	0.16	2.37	0.19	0.51
Unit 49 Fairbanks/Morse 1800 HP Diesel Engine/Generator @ 100 hrs/yr	0.20	0.20	0.19	2.79	0.22	0.60
<b>TOTALS</b>	27.0	18.1	719	827	12.7	143
<b>ACTUAL EMISSIONS 2000 DATA YEAR</b>						
	8.2	8.2	7.7	316.9	2.70	40.9

Shaded values NOT used in PTE Totals

### **III. EMISSION SOURCES**

#### **S001 Boiler #6**

**1. Applicable Requirements** - Unit S001 was installed in 1972 prior to Construction Permit requirements. There are few applicable requirements since the boiler is “grandfathered” from any Construction Permit requirements (Colorado Regulation No. 3, Part B, Section I.A.). While the boiler has no limitations or standards for most pollutants, actual emissions must be calculated for fee and inventory purposes.

In the previous Operating Permit the boiler was identified as burning only natural gas for fuel. Lamar L&P has reviewed the boiler design and found the boiler was originally designed and equipped to burn diesel fuel even though the equipment had not been used for a long time. Lamar L&P requested the renewed Operating Permit incorporate the capability of the boiler to burn diesel fuel. The applicable requirements related to the use of diesel fuel have been incorporated into this renewal of the Operating Permit.

The boiler is subject to the particulate standard for fuel burning equipment as stated in Colorado Regulation No. 1, Section III.A.1.b. The regulation requires compliance with a particulate matter emission limit (PE) of 0.11 pounds per million Btu at the boiler design heat input rate, based on the following equation:

$$PE = 0.5(FI)^{-0.26} \text{ where FI = Fuel Input in Million Btu per Hour, and}$$

PE = Particulate Emission limit in pounds per million Btu of heat input.

This boiler is subject to the sulfur dioxide standard of 0.8 pounds per million Btu of heat input of Colorado Regulation No. 1, Section VI.A.3.b(ii) when burning fuel oil.

The boiler must meet the 20% opacity standard of Colorado Regulation No. 1, Section II as described under the monitoring section below.

**2. Emission Factors** - Emissions from the boiler are produced from the combustion of organic fuels. The pollutants of interest are Nitrogen Oxides (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), Carbon Monoxide (CO), Volatile Organic Compounds (VOC), Particulate Matter (PM), and a subset of PM, Particulate Matter under 10 microns (PM<sub>10</sub>). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted due to incomplete combustion. The relative quantities of each pollutant are dependant upon the fuel burned. The main pollutants of concern from natural gas combustion are NO<sub>x</sub> and CO.

Several of the boiler natural gas emission factors published in the EPA published reference “AP-42 Supplement B to Compilation of Air Pollutant Emission Factors” have changed since the previous Operating Permit was issued. Lamar L&P requested the emission factor for the nitrogen oxides emissions not be changed to reflect the new lower value. Lamar L&P believes the outdated AP-42 emission factor of 550 pounds per million cubic feet of gas combusted best represents the nitrogen oxides emissions from the boiler

based on their testing and operating experience. The Division accepts this conservative request for use of a higher value.

Lamar L&P requested the use of 1.04 pounds per thousand gallons of fuel oil for the VOC emission factor rather than 0.2 pounds per thousand gallons. The Division accepts the use of the more conservative emission factor. Lamar L&P requested the diesel fuel emission factors be shown as pounds per gallon instead of the more conventional expression of pounds per thousand gallons. The diesel fuel use is small and measured in gallons. The expression of the emission factors as pounds per gallon allows direct calculation of the emissions from the fuel use records.

**3. Monitoring Plan** - All sources are required to monitor and record emissions for fee and inventory purposes. Fuel use will be measured and recorded annually so that annual emissions may be determined using the emission factors specified in the Operating Permit.

The combination of the emission factor and the heat content of the boiler fuel precludes exceeding the short term particulate emission standard while burning fuel oil or natural gas as demonstrated by the following calculations:

$$\text{Diesel Fuel: } \frac{2 \text{ lb}}{1000 \text{ gal}} \times \frac{\text{gal}}{139,000 \text{ Btu}} = 0.0144 \frac{\text{lb}}{\text{MMBtu}} \ll 0.11 \frac{\text{lb}}{\text{MMBtu}}$$

$$\text{Natural Gas: } \frac{7.6 \text{ lb}}{\text{MMscf}} \times \frac{\text{scf}}{950 \text{ Btu}} = 0.008 \frac{\text{lb}}{\text{MMBtu}} \ll 0.11 \frac{\text{lb}}{\text{MMBtu}}$$

Likewise, the emission factor/fuel heat content combination assures compliance with the sulfur dioxide short term standard for diesel fuel as demonstrated by the following calculation:

$$\text{Diesel Fuel: } \frac{142 \times 0.5 \text{ lb}}{1000 \text{ gal}} \times \frac{\text{gal}}{139,000 \text{ Btu}} = 0.51 \frac{\text{lb}}{\text{MMBtu}} < 0.8 \frac{\text{lb}}{\text{MMBtu}}$$

Lamar L&P only needs to retain a file copy of the above calculations for demonstrating this compliance in the absence of any other credible evidence.

The Division has determined, based upon AP-42 emission factors and engineering judgment, that visible emissions from boilers when burning natural gas will be insignificant. The restriction to using natural gas for the gaseous fuel will ensure compliance with the 20% opacity standard unless there is credible evidence to the contrary. Observation of visible emissions while burning diesel fuel will trigger the need for Method 9 opacity observations.

**4. Compliance Status** - Lamar L&P certified compliance with all applicable requirements at the time of the Title V Operating Permit renewal. Based upon the information provided and an inspection of the equipment covered in the application, the Division accepts the boiler is in compliance with all applicable requirements.

### **S003 Mercury 50 Combustion Turbine**

**1. Applicable Requirements** - Construction Permit 99PR0049 was issued for the turbine/generator unit. The compliance test required by the Construction Permit was delayed until July 2001. The compliance test identified compliance with the permit limits.

The turbine is subject to the particulate standard for fuel burning equipment as stated in Colorado Regulation No. 6, Part B, Section II.C.2. The regulation requires compliance with a particulate matter emission limit (PE) of 0.20 pounds per million Btu at the turbine design heat input rate, based on the following equation:

$$PE = 0.5(FI)^{-0.26} \text{ where FI = Fuel Input in Million Btu per Hour and}$$

PE = Particulate Emissions in pounds per million Btu.

Colorado Regulation No. 6, Part B, Section II.D.3.a. sets a limit of 0.8 pounds of sulfur dioxide per million Btu of heating input

Additionally, the turbine must meet the opacity standards set by Colorado Regulation No. 1, Section II.

The turbine/generator set has a New Unit Exemption from the Acid Rain provisions as long as the average annual sulfur content of the natural gas being burned remains below 0.05% by weight.

The turbine is subject to the provisions of the New Source Performance Standards (NSPS), Subpart GG, “Standards of Performance for Stationary Gas Turbines”. Subpart GG §60.332(l) exempts a regenerative turbine with a heat input of less than 100 million Btu per hour from a short term limit (ppm) for nitrogen oxides. Subpart GG §60.333 allows compliance with either a sulfur dioxide emission limit or compliance with a maximum limit of 0.8% sulfur in the natural gas. Lamar Light & Power will maintain compliance with the natural gas sulfur limit.

**2. Emission Factors** - Emissions from the turbine are produced from the combustion of natural gas. The pollutants of interest are Nitrogen Oxides (NO<sub>x</sub>), Sulfur Dioxide (SO<sub>2</sub>), Carbon Monoxide (CO), Volatile Organic Compounds (VOC), Particulate Matter (PM), and a subset of PM, Particulate Matter under 10 microns (PM<sub>10</sub>). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted due to incomplete combustion. The relative quantities of each pollutant are dependant upon the fuel burned. The main pollutants of concern from natural gas combustion are NO<sub>x</sub> and CO.

Lamar L&P requested to use a mixture of EPA AP-42 approved emission factors, and emission factors provided by the turbine manufacturer. If the manufacturer emission factors values are greater than the AP-42 emission factors, the Division accepts the use of the factor without the need for validation. If the emission factors values are less than the AP-42 emission factors, the Division requires a compliance test to demonstrate compliance with the permit limits.

Pollutants	AP-42 Emission Factor lb/MMBtu	Manufacturer Emission Factor lb/MMBtu
NO <sub>x</sub>	0.099	0.0992
VOC	0.0021	0.012075
CO	0.015	0.1207
SO <sub>2</sub>	0.94S (0.0470)	
PM	0.0419	
PM <sub>10</sub>	0.0419	

Shaded values represent emission factors not being used

The AP-42 emission factor for sulfur dioxide is 0.94S where “S” is the weight percent sulfur in the natural gas. The Acid Rain exemption for the turbine requires the natural gas being burned have a sulfur content of less than 0.05%. However, Lamar L&P expects the natural gas sulfur content to be nearly negligible. The sulfur dioxide emission factor becomes  $0.94 \times 0.05 = 0.0470$  pounds per million Btu for a worst case scenario.

The AP-42 emission factor for particulate emissions has been updated to 0.0066 pounds per million Btu. However, the Construction Permit and the modeling were done based on the outdated emission factor of 0.0419 pounds per million Btu. The modeling required for the Construction Permit demonstrated acceptable results even with the use of the outdated emission factor. Lamar L&P has requested to continue to use the outdated emission factor which is higher than the AP-42 emission factor. This is a conservative approach acceptable to the Division.

**3. Monitoring Plan** – The natural gas use is to be measured by a gas metering system. The computer system for the turbine records the fuel use rate hourly and serves as a backup system for the metering.

The turbine design identifies the current EPA AP-42 particulate matter emission factor as 0.0419 pounds per million Btu. Since the emission factor (0.0419) and the short term emission standard (0.20) are expressed in the same units of measure, and the emission factor is much smaller than the emission standard, the turbine design assures the 0.20 pounds per million Btu limit set by Regulation No. 6 will never be exceeded when burning natural gas unless there is other credible evidence to the contrary. A similar argument may be made for compliance with the Regulation No. 6 short term sulfur dioxide limit.

It is noted that the natural gas supply for the boiler and the turbine is a mixture of natural gas provided by

gas wells owned, operated or leased by Lamar Light & Power or purchased from local wells or regional gas sources. The NSPS Subpart GG provisions require monitoring of the fuel nitrogen and sulfur content. A letter from EPA to Lamar L&P, dated December 21, 1999, exempted the turbine from the requirement to monitor the fuel nitrogen content as long as pipeline quality natural gas was combusted. In addition, the letter established a natural gas sulfur content monitoring schedule. The letter also approved the use of the Gas Processors Association Standard 2377-86 Length of Stain test for measuring the gas sulfur content. A Division approved fuel sampling/testing plan will be followed to demonstrate compliance with the natural gas sulfur content. The natural gas sulfur content sampling/testing frequency will follow the schedule previously approved in writing by EPA. The lack of sustained operation of the turbine engine has delayed the implementation of the fuel sampling program. There is no purpose in sampling the gas if the turbine is not operating.

Compliance with the annual limits will be demonstrated by the calculation of the emissions from the gas consumption and the emission factors identified in the table above.

The Division has determined, based upon AP-42 emission factors and engineering judgment, that visible emissions from the turbine when burning natural gas will be insignificant. Therefore, unless other credible evidence is presented, the turbine emissions will be considered to be in compliance with the opacity standard as long as pipeline quality natural gas is the only fuel combusted.

**4. Compliance Status-** Since the turbine covered by modification of Construction Permit 99PR0049 will have been operating for more than 180 days by the due date of the first semi-annual monitoring report required by this renewed Operating Permit, the Division considers that the Responsible Official certification submitted with that report will serve as the self-certification for the modified Construction Permit. This facility certified that they were in compliance with all applicable requirements at the time of the submittal of the renewal application for the Title V Operating Permit. Based upon the information provided and inspections of the equipment covered in the application, this facility is considered to be in compliance with all applicable requirements.

#### **IV. ALTERNATE OPERATING SCENARIOS**

Lamar L&P requested the previous Title V permit be modified to incorporate the turbine construction permit and provide an alternate operating scenario to try to avoid repeated openings of the Operating Permit for replacement of the engine.

#### **V. MISCELLANEOUS**

The Title V permit has been modified to reflect the standardized format now currently in use by the Division, and wording approved by EPA.

As noted in the Technical Review Document for the previous Operating Permit the Division believed the Operating Permits would be improved if the potential-to-emit (PTE) values were shown in the permit for

grandfathered sources. The PTE of a grandfathered source is set by the design capacity, and the values represent an operating limit, not a regulatory limit. The inclusion of these values provides the permit reviewer with a perspective of the maximum emissions for a source.

From time to time published emission factors are changed based on new or improved data as demonstrated by the change in emission factors for the renewal permit. A logical concern is what happens if the use of the new emission factor in a calculation results in a source being out of compliance with a permit limit. For this Operating Permit, the emission factors or emission factor equations included in the permit are fixed until changed by a modification of the permit. Obviously, factors dependent on the fuel sulfur content or heat content cannot be fixed and will vary with the test results. The formula for determining the emission factors is, however, fixed. It is the responsibility of the permittee to be aware of changes in the factors, and to notify the Division in writing of impacts on the permit requirements when there is a change in factors. Upon notification, the Division will work with the permittee to address the situation.